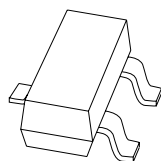


# DATA SHEET



**PBSS4140T**

**40 V, 1A**

**NPN low  $V_{CEsat}$  (BISS) transistor**

Product specification  
Supersedes data of 2001 Jul 13

2004 Mar 16

# 40 V, 1A NPN low $V_{CEsat}$ (BISS) transistor

PBSS4140T

## FEATURES

- Low collector-emitter saturation voltage
- High current capabilities.
- Improved device reliability due to reduced heat generation.

## APPLICATIONS

- General purpose switching and muting
- LCD backlighting
- Supply line switching circuits
- Battery driven equipment (mobile phones, video cameras and hand-held devices).

## DESCRIPTION

NPN low  $V_{CEsat}$  transistor in a SOT23 plastic package.  
PNP complement: PBSS5140T.

## MARKING

TYPE NUMBER	MARKING CODE <sup>(1)</sup>
PBSS4140T	ZT*

### Note

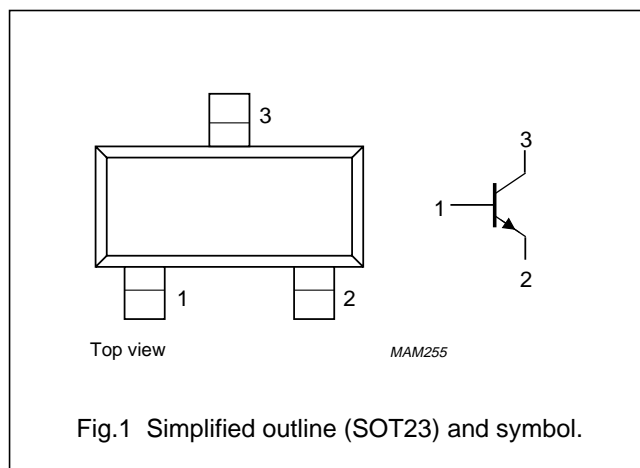
1. \* = p: made in Hong Kong.  
\* = t: made in Malaysia.  
\* = W: made in China.

## QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
$V_{CEO}$	collector-emitter voltage	40	V
$I_{CM}$	peak collector current	2	A
$R_{CEsat}$	equivalent on-resistance	<500	mΩ

## PINNING

PIN	DESCRIPTION
1	base
2	emitter
3	collector



## ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
PBSS4140T	–	plastic surface mounted package; 3 leads	SOT23

# 40 V, 1A NPN low $V_{CEsat}$ (BISS) transistor

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## LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 60134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{CBO}$	collector-base voltage	open emitter	–	40	V
$V_{CEO}$	collector-emitter voltage	open base	–	40	V
$V_{EBO}$	emitter-base voltage	open collector	–	5	V
$I_C$	collector current (DC)		–	1	A
$I_{CM}$	peak collector current		–	2	A
$I_{BM}$	peak base current		–	1	A
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$ ; note 1	–	300	mW
		$T_{amb} \leq 25\text{ °C}$ ; note 2	–	450	mW
$T_{stg}$	storage temperature		–65	+150	°C
$T_j$	junction temperature		–	150	°C
$T_{amb}$	operating ambient temperature		–65	+150	°C

## Notes

1. Device mounted on a printed-circuit board; single sided copper; tinplated; standard footprint.
2. Device mounted on a printed-circuit board; single sided copper; tinplated; mounting pad for collector 1 cm<sup>2</sup>.

## THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	TYPICAL	UNIT
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air; note 1	417	K/W
		in free air; note 2	278	K/W

## Notes

1. Device mounted on a printed-circuit board, single sided copper, tinplated and standard footprint.
2. Device mounted on a printed-circuit board, single sided copper, tinplated, mounting pad for collector 1 cm<sup>2</sup>.

# 40 V, 1A NPN low $V_{CEsat}$ (BISS) transistor

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## CHARACTERISTICS

$T_{amb} = 25\text{ °C}$  unless otherwise specified.

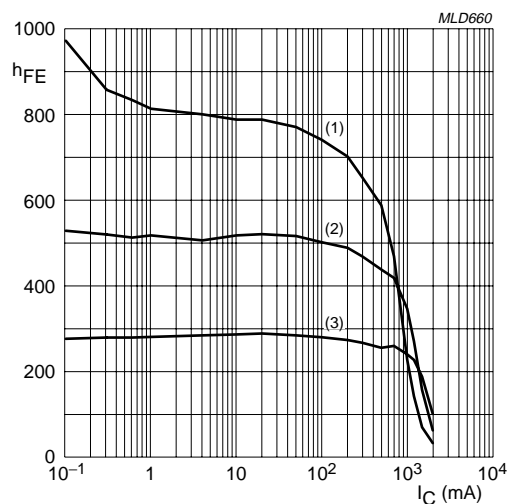
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$I_{CBO}$	collector-base cut-off current	$V_{CB} = 40\text{ V}; I_E = 0\text{ A}$	–	–	100	nA
		$V_{CB} = 40\text{ V}; I_E = 0\text{ A}; T_{amb} = 150\text{ °C}$	–	–	50	$\mu\text{A}$
$I_{CEO}$	collector-emitter cut-off current	$V_{CE} = 30\text{ V}; I_B = 0\text{ A}$	–	–	100	nA
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = 5\text{ V}; I_C = 0\text{ A}$	–	–	100	nA
$h_{FE}$	DC current gain	$V_{CE} = 5\text{ V}; I_C = 1\text{ mA}$	300	–	–	
		$V_{CE} = 5\text{ V}; I_C = 500\text{ mA}$	300	–	900	
		$V_{CE} = 5\text{ V}; I_C = 1\text{ A}$	200	–	–	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 100\text{ mA}; I_B = 1\text{ mA}$	–	–	200	mV
		$I_C = 500\text{ mA}; I_B = 50\text{ mA}$	–	–	250	mV
		$I_C = 1\text{ A}; I_B = 100\text{ mA}$	–	–	500	mV
$R_{CEsat}$	equivalent on-resistance	$I_C = 500\text{ mA}; I_B = 50\text{ mA}; \text{note 1}$	–	260	<500	$\text{m}\Omega$
$V_{BEsat}$	base-emitter saturation voltage	$I_C = 1\text{ A}; I_B = 100\text{ mA}$	–	–	1.2	V
$V_{BEon}$	base-emitter turn-on voltage	$V_{CE} = 5\text{ V}; I_C = 1\text{ A}$	–	–	1.1	V
$f_T$	transition frequency	$I_C = 50\text{ mA}; V_{CE} = 10\text{ V}; f = 100\text{ MHz}$	150	–	–	MHz
$C_c$	collector capacitance	$V_{CB} = 10\text{ V}; I_E = I_C = 0\text{ A}; f = 1\text{ MHz}$	–	–	10	pF

## Note

1. Pulse test:  $t_p \leq 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.02$ .

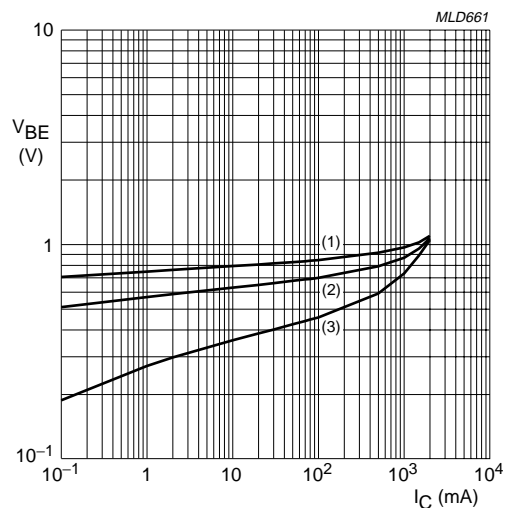
# 40 V, 1A NPN low $V_{CEsat}$ (BISS) transistor

PBSS4140T

 $V_{CE} = 5 \text{ V.}$ 

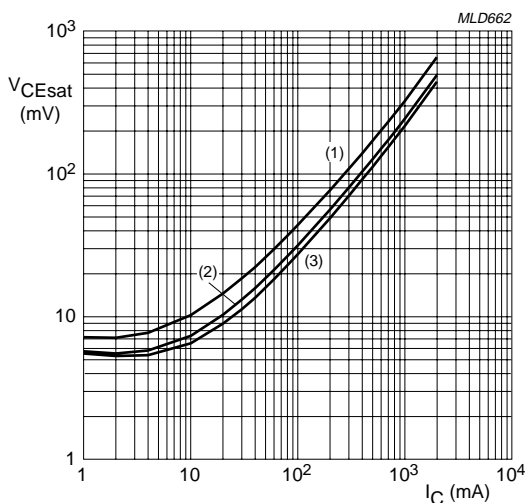
- (1)  $T_{amb} = 150 \text{ }^{\circ}\text{C.}$
- (2)  $T_{amb} = 25 \text{ }^{\circ}\text{C.}$
- (3)  $T_{amb} = -55 \text{ }^{\circ}\text{C.}$

Fig.2 DC current gain as a function of collector current; typical values.

 $V_{CE} = 5 \text{ V.}$ 

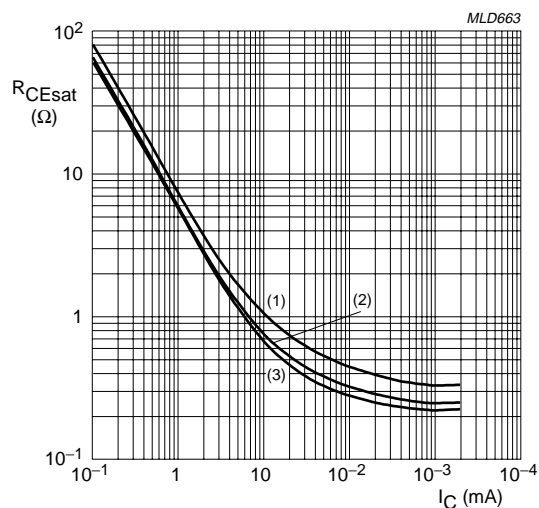
- (1)  $T_{amb} = -55 \text{ }^{\circ}\text{C.}$
- (2)  $T_{amb} = 25 \text{ }^{\circ}\text{C.}$
- (3)  $T_{amb} = 150 \text{ }^{\circ}\text{C.}$

Fig.3 Base-emitter voltage as a function of collector current; typical values.

 $I_C/I_B = 10.$ 

- (1)  $T_{amb} = 150 \text{ }^{\circ}\text{C.}$
- (2)  $T_{amb} = 25 \text{ }^{\circ}\text{C.}$
- (3)  $T_{amb} = -55 \text{ }^{\circ}\text{C.}$

Fig.4 Collector-emitter saturation voltage as a function of collector current; typical values.

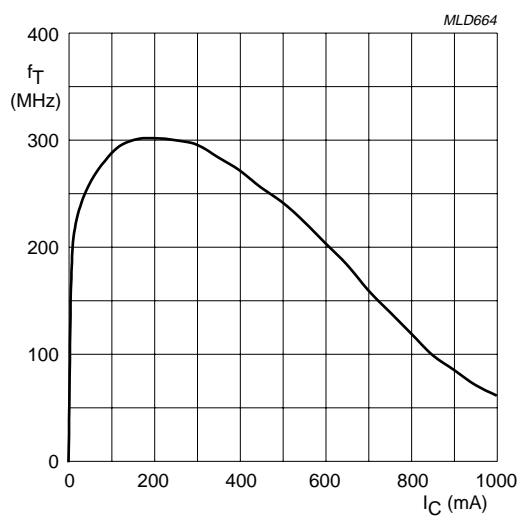
 $I_C/I_B = 10.$ 

- (1)  $T_{amb} = 150 \text{ }^{\circ}\text{C.}$
- (2)  $T_{amb} = 25 \text{ }^{\circ}\text{C.}$
- (3)  $T_{amb} = -55 \text{ }^{\circ}\text{C.}$

Fig.5 Equivalent on-resistance as a function of collector current; typical values.

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$V_{CE} = 10$  V.

Fig.6 Transition frequency as a function of collector current.

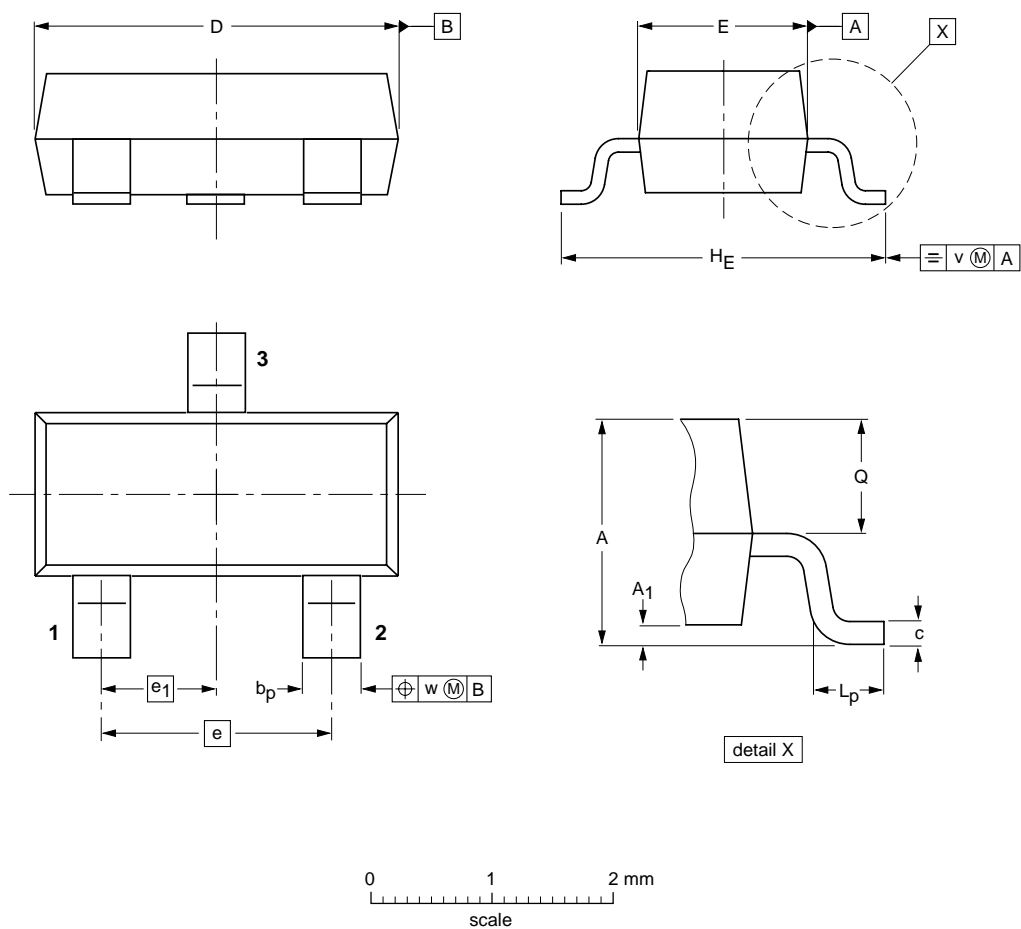
40 V, 1A  
NPN low  $V_{CEsat}$  (BISS) transistor

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PACKAGE OUTLINE

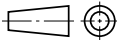
Plastic surface mounted package; 3 leads

SOT23



DIMENSIONS (mm are the original dimensions)

UNIT	A	A <sub>1</sub> max.	b <sub>p</sub>	c	D	E	e	e <sub>1</sub>	H <sub>E</sub>	L <sub>p</sub>	Q	v	w
mm	1.1 0.9	0.1	0.48 0.38	0.15 0.09	3.0 2.8	1.4 1.2	1.9	0.95	2.5 2.1	0.45 0.15	0.55 0.45	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT23		TO-236AB				97-02-28 99-09-13

40 V, 1A  
NPN low  $V_{CEsat}$  (BISS) transistor

PBSS4140T

## DATA SHEET STATUS

LEVEL	DATA SHEET STATUS <sup>(1)</sup>	PRODUCT STATUS <sup>(2)(3)</sup>	DEFINITION
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